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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/603,071	06/24/2003	Frederick G. Walther	0050.2055-001	8598
21005 7590 10/17/2007 HAMILTON, BROOK, SMITH & REYNOLDS, P.C. 530 VIRGINIA ROAD P.O. BOX 9133 CONCORD, MA 01742-9133			EXAMINER LIU, LI	
			ART UNIT 2613	PAPER NUMBER
			MAIL DATE 10/17/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/603,071

Applicant(s)

WALTHER ET AL.

Examiner

Li Liu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 July 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 11, 26, 27, 29-36, 39, 54-83, 85-99, 101-115, 117 and 118 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 85-99 and 101-115 is/are allowed.
- 6) ☒ Claim(s) 1-8, 11, 26, 27, 29-36, 39, 54-67 and 79-83 is/are rejected.
- 7) ☐ Claim(s) 68-78 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 February 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed on 7/30/2007 with respect to claims 1-15 and 17-19 have been fully considered but they are not persuasive. The examiner has thoroughly reviewed Applicant's amendment and arguments but firmly believes that the cited reference reasonably and properly meet the claimed limitation as rejected.

1). Applicant's argument – "Moon does not teach or suggest dynamically and independently steering signals to and from remote devices. The spatial light modulator of Moon does not steer signals but instead filters out portions of the incoming signal. The remaining un-deflected radiation of the optical channels reflects back though the same optical path towards the circulator 16 (Moon, Fig. 1). Therefore, the deflectors of Moon simply reverses the direction of the incoming light, it is the circulator 16, not the deflectors, which directs the signal to and from different locations. Thus, Moon fails to show deflectors which steer (which Applicants respectfully assert is not equivalent to filtering) signals to and from remote devices (not simply reflecting light in a reverse direction though an optical path)".

Examiner's response – Examiner firmly believe that the reference of Moon reads on the applicant's claims. E.g., Moon uses deflectors, 52 in Figure 2 and 3 or 30 in Figure 12, to dynamically and independently steer signals to and from remote devices (e.g., the circulator 16 in Figure 1 is viewed as the remote device); and the angle of the deflector is dynamically controlled by a controller (e.g., 58 in Figure 2). Refer to Figure 12, the spatial light modulator of Moon does steer signals, the signal can be steered

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from one path (12 in Figure 12a) to another (38 in Figure 12a), not just filter out portions of the incoming signal. The deflectors of Moon do not just reverse the direction of the incoming light (Figure 12), Moon shows deflectors which steer signals to and from remote devices (e.g., the device where the signal 12 come from, and the device where the signal 38 goes to).

2). Applicant's argument –Riley does not teach or suggest deflecting waves at a dynamic angle. Instead, Riley teaches away from the use of dynamic reflection and teaches the use of static deflectors. Riley explains the importance of the lenses sustaining a sufficient distance away from the filters in order to minimize the clear aperture requirement for the lenses in the device of Riley (Col. 30, lines 58-61). Thus, Claim 56 patentably distinguishes Riley.

Examiner's response – According to the applicant, the angles of the reflectors depend on the "directions of communication" (page 10, line 22-24). In Figure 29 of Riley, the angles of the deflectors 266-272 are depended on the positions of the object 24, for the specific position shown in Figure 29, the angles of the deflectors are *static*, and each deflector has different angle. However, Riley et al also teaches "it is also contemplated that in some cases, the object may remain stationary and the imaging system move relative to it. As a further alternative, both the imaging system and the object may be in **motion** but either in different directions or at different rates" (page 22, line 32-40). Therefore, it is inherent that when the object or the imaging system is moving in a specific direction, the angles of the deflectors 266-272 must be adjusted so that the image of the object can be projected on to the detectors. That is, Riley's

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apparatus is fully capable of dynamically steering the angles of the deflectors, and the angles of the deflectors are *dynamic* while the system is in motion. Therefore, Riley does not teach away from the use of dynamic reflection.

3). Applicant's argument – “while Rockwell and Sakanaka are in the same field of endeavor (e.g., optical communications), Riley is in a different field of endeavor (e.g., optical imaging). Applicants further assert Riley is not reasonably pertinent to any particular problem associated with which the inventor was concerned”. “Riley teaches *static* wavelength dependent deflectors”. Therefore, a combination of Rockwell, Sakanaka, and Riley would feature *static* deflectors”. And “the prior art of record fails to show dynamic wavelength dependent deflectors”.

Examiner's response –In response to applicant's argument that Riley is nonanalogous art, Riley teaches a stack of wavelength dependent deflectors, and each deflector passes a wavelength band and deflects another wavelength band. The claimed invention also uses a stack of deflectors to pass a wavelength band and deflect another wavelength band so to steer the light beam. Therefore, Riley is reasonably pertinent to the particular problem with which the applicant was concerned.

And the combination of the prior arts of record shows dynamic wavelength dependent deflectors. As discussed in section “2).” above, Riley's apparatus is fully capable of dynamically steering the angles of the deflectors, and the angles of the deflectors are *dynamic* while the system is in motion. Also, Rockwell and Sakanaka teach a deflector which deflects optical signals dynamically (66 in Figure 2 of Rockwell; or 24 in Figure 1 of Sakanaka). But Rockwell and Sakanaka use one deflector. Since

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Riley teaches a stack of deflectors, it would be obvious to one skilled in the art to apply the deflector and wavelength dependent deflecting as taught by Sakanaka and Riley to the system of Rockewell so that the system can transmit and receive to and from multiple remote devices at a time and the system capacity can be substantially increased.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 3, 27, 29, 31, 55, 57, 59, 83 and 117 and 118 are rejected under 35 U.S.C. 102(e) as being anticipated by Moon et al (US 2002/0176151).

1). With regard to claim 1, Moon et al discloses a communication device (Figure 1) comprising:

an aperture structure (e.g., 24 and 26 in Figure 1, or 24, 26 and 84 in Figure 12a); and

wavelength dependent deflectors (the deflectors on the spatial light modulator 36 in Figures 1 and 12b, the detail is shown in Figures 2 and 3) deflecting respective electromagnetic signals of respective wavelengths (Figure 2 and 3, each deflector

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reflects respective different wavelength) at different respective wavelength dependent angles (the angle of the deflector is dynamically controlled by a controller, e.g., 58 in Figure 2) to dynamically and independently steer (controlled by a controller, page 5, [0109]) the electromagnetic signals passing through the aperture structure to and from remote devices (the signal to and from the circulator 16 in Figure 1; or the device where the signal 12 come from, and the device where the signal 38 goes to).

2). With regard to claim 3, Moon et al discloses wherein at least one of the deflectors is movable (Figure 3, the deflector can be tilted, page 3, [0109]).

3). With regard to claim 27, Moon et al discloses wherein the aperture structure is a telescope (the capillary tube 24 and collimator 26 forms a telescope structure, Figure 1).

4). With regard to claim 29, Moon et al discloses method for communication comprising:

passing electromagnetic signals through an aperture structure (24 and 26 in Figure 1, or 24, 26 and 84 in Figure 12a); and

deflecting respective electromagnetic signals of respective wavelengths at different respective angles (e.g., Figure 2 and 3, each deflector reflects respective different wavelength), by wavelength dependent deflectors the deflectors on the spatial light modulator 36, as shown in greater detail in Figures 2 and 3) to dynamically and independently steer the electromagnetic signals (controlled by a controller, page 5, [0109]) passing through the aperture structure to and from remote devices (the signal to and from the circulator 16 in Figure 1).

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5). With regard to claim 31, Moon et al discloses wherein at least one of the deflectors is movable (Figure 3, the deflector can be tilted, page 3, [0109]).

6). With regard to claim 55, Moon et al discloses wherein the aperture structure is a telescope (the capillary tube 24 and collimator 26 forms a telescope structure, Figure 1).

7). With regard to claim 57, Moon et al discloses a communication device (Figure 1) comprising:

aperture means (e.g., 24 and 26 in Figure 1, or 24, 26 and 84 in Figure 12a); and
means (the deflectors on the spatial light modulator 36, as shown in greater detail in Figures 2 and 3) for wavelength dependent deflecting of respective wavelength division multiplexing electromagnetic signals (Figure 2 and 3, each deflector reflects respective different wavelength) of respective wavelengths at different respective angles (the angle of the deflector is dynamically controlled by a controller 58, Figures 2 and 3) to dynamically and independently steer (controlled by a controller, page 5, [0109]) the electromagnetic signals passing through the aperture means to and from remote devices (the signal to and from the circulator 16 in Figure 1).

8). With regard to claim 59, Moon et al discloses wherein at least one of the means for deflecting is movable (Figure 3, the deflector can be tilted, page 3, [0109]).

9). With regard to claim 83, Moon et al discloses wherein the aperture means is a telescope (the capillary tube 24 and collimator 26 forms a telescope structure, Figure 1).

10). With regard to claim 117 and 118, Moon et al discloses wherein the device or method transmits and/or receives wavelength division multiplexing electromagnetic

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signals (the signal to aperture 24 and 26 is a wavelength division multiplexed optical signal).

4. Claim 56 is rejected under 35 U.S.C. 102(e) as being anticipated by Riley et al (US 6,763,149).

Reiley et al discloses a method for deflecting electromagnetic waves comprising:
independently deflecting electromagnetic waves within a first wavelength band at a dynamic angle (Figure 29, e.g., the deflector 266 deflects electromagnetic wave within a first wavelength band "Red" at a specific angle. Each deflector has different angle. Riley et al also teaches "it is also contemplated that in some cases, the object may remain stationary and the imaging system move relative to it. As a further alternative, both the imaging system and the object may be in motion but either in different directions or at different rates" (page 22, line 32-40). Therefore, it is inherent that when the object or the imaging system is moving in a specific direction, the angles of the deflectors 266-272 must be adjusted so that the image of the object can be projected on to the detectors. Riley's apparatus is fully capable of dynamically steering the angles of the deflectors) and passing electromagnetic waves within a second wavelength band by a first deflector (the deflector 266 passes electromagnetic waves within a second wavelength band "Yellow" or "Green" or "Blue"); and

independently deflecting electromagnetic waves within a second wavelength band, at a dynamic angle (Figure 29, e.g., the deflector 268 deflects electromagnetic wave within a second wavelength band "Yellow" at a specific angle. Riley et al also teaches "it is also contemplated that in some cases, the object may remain stationary

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and the imaging system move relative to it. As a further alternative, both the imaging system and the object may be in motion but either in different directions or at different rates" (page 22, line 32-40). Therefore, it is inherent that when the object or the imaging system is moving in a specific direction, the angles of the deflectors 266-272 must be adjusted so that the image of the object can be projected on to the detectors. Riley's apparatus is fully capable of dynamically steering the angles of the deflectors), by a second deflector (Figure 29, the deflector 268 deflects electromagnetic waves within a second wavelength band "Yellow"), the second deflector positioned to receive the electromagnetic waves passed through the first deflector (the deflector 268 receives the electromagnetic waves "Yellow" or "Green" or "Blue" passed through the first deflector).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 3-8, 11, 26, 27, 29, 31-36, 39, 54, 55, 57, 59-65, 67, 79, 80, 82, 83, 117 and 118 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rockwell (US 6,327,063) in view of Sakanaka (US 7,058,307) and Riley et al (US 6,763,149).

1). With regard to claims 1, 29 and 57, Rockwell discloses a device and method for communication (Figure 2) comprising:

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an aperture structure (the telescope 64 in Figure 2, for passing electromagnetic signals); and

deflector (the mirror 62 in Figure 2) deflecting respective electromagnetic signals at different angles (Figure 2, the mirror 62 is rotated to fine tune the signal beams, column 7 line 57 to column 8 line 21) to dynamically and independently steer the electromagnetic signals passing through the aperture structure to and from remote devices (the signals λ_T and λ_R is steered to passing through the aperture structure to and from remote devices such as satellite or ground station, Figure 1).

But, Rockewell does not disclose that the deflector is wavelength dependent, and the deflectors deflect respective electromagnetic signals of respective wavelengths at different respective wavelength dependent angles.

However, Sakanaka, in the same field of endeavor, discloses a deflector (the mirror 23 in Figure 1) that can dynamically deflect different signals from different transceivers at different angles (11a, 11b and 11c in Figure 1, column 4, line 31-61). But, Sakanaka teaches one deflector, and the base system 10 in Figure 1 can transmit and receive to and from only one remote device at a time. However, another prior art, Riley et al, discloses a stack of wavelength dependent deflectors (266, 268, 270 and 272 in Figure 29, and 103 in Figure 1B), and the deflectors deflect respective electromagnetic signals of respective wavelengths (e.g., the RED, YELLOW, GREEN and BLUE) at different respective wavelength dependent angles (Figure 29, each deflector has different deflecting angle).

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Sakanaka teaches to communicate with different remote devices through deflector, Riley et al teaches a stack of wavelength dependent deflectors, the combination of Sakanaka and Riley et al can make the device of Sakanaka to communicate with multiple device at the same time. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the deflector and wavelength dependent deflecting as taught by Sakanaka and Riley to the system of Rockwell so that the system can transmit and receive to and from multiple remote devices at a time and the system capacity can be substantially increased.

2). With regard to claims 3, 31 and 59, Rockwell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 29 and 57 above. And Rockwell and Sakanaka and Riley et al further disclose wherein at least one of the deflectors is movable (e.g., 62 in Figure 2 of Rockwell, and 24 in Figure 1 of Sakanaka).

3). With regard to claims 4, 32 and 60, Rockwell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 29 and 57 above. And Rockwell and Sakanaka and Riley et al further disclose wherein the deflectors form a first stack, a deflector in the first stack passing a signal deflected by another deflector in the first stack (Figure 29 of Riley et al, the deflectors 266, 268, 270 and 272 form a stack; and a deflector, e.g., 270, passes a signal, e.g. "BLUE" deflected by another deflector, e.g., deflector 272).

4). With regard to claims 5, 33 and 61, Rockwell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 4, 29, 32, 57 and 60 above. And Rockwell and Sakanaka and Riley et al further disclose wherein at least one deflector in

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the first stack deflects substantially all signals within a wavelength band (Figure 29 of Riley et al, the deflectors 266, 268, 270 and 272 form a stack; and the deflector 272 deflect all signals within a wavelength band "BLUE").

5). With regard to claims 6, 34 and 62, Rockwell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 4, 5, 29, 32, 33, 57, 60 and 61 above. And Rockwell and Sakanaka and Riley et al further disclose wherein individual deflectors in the first stack deflect substantially all signals each within its respective non-overlapping wavelength band (Figure 29 of Riley et al, e.g., the deflector 266 deflect substantially all signals each within its respective non-overlapping wavelength band "RED", and the deflector 270 deflect substantially all signals each within its respective non-overlapping wavelength band "GREEN") and pass signals deflected by other deflectors in the first stack (Figure 29 of Riley et al, e.g., the deflector 266 pass signals "YELLOW", GREEN" and "BLUE" deflected by other deflectors in the first stack).

6). With regard to claims 7, 35 and 63, Rockwell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 4-6, 29, 32-34, 57 and 60-62 above. And Rockwell and Sakanaka and Riley et al further disclose wherein at least one of the deflectors in the first stack is movable (e.g., 62 in Figure 2 of Rockwell, and 24 in Figure 1 of Sakanaka).

Although Rockwell and Sakanaka and Riley et al don't specifically disclose to reflect signals at nearly normal incidence, such limitation are merely a matter of design choice and would have been obvious in the system of Rockwell and Sakanaka and Riley et al. Rockwell and Sakanaka and Riley et al teach reflecting different signal at

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different angles. The limitations in claims 7, 35 and 63 do not define a patentably distinct invention over that in Rockwell and Sakanaka and Riley et al since both the invention as a whole and Rockwell and Sakanaka and Riley et al are directed to wavelength dependent deflectors. The reflecting angles are determined by the positions of the remote device and the transceiver at the base system. Therefore, to reflect signals at nearly normal incidence in Rockwell and Sakanaka and Riley et al would have been a matter of obvious design choice to one of ordinary skill in the art.

7). With regard to claims 8, 36 and 64, Rockwell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 4-6, 29, 32-34, 57 and 60-62 above. And Rockwell and Sakanaka and Riley et al further disclose wherein the deflectors in the first stack are reflectors (Figure 29 of Riley et al and Figure 2 of Rockwell, the deflectors are reflectors).

8). With regard to claims 11, 39 and 67, Rockwell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 4, 29, 32, 57 and 60 above. And Rockwell and Sakanaka and Riley et al further disclose wherein individual deflectors in the first stack pass signals deflected by other deflectors in the first stack (Figure 29 of Riley et al, e.g., the deflector 266 pass signals "YELLOW", GREEN" and "BLUE" deflected by other deflectors in the first stack).

9). With regard to claims 26, 54 and 82, Rockwell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 29 and 57 above. And Rockwell and Sakanaka and Riley et al further disclose wherein electromagnetic signals deflected by at least one of the deflectors carry communications transmitted by the device and

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communications received by the device (Figures 1 and 2 of Rockwell, the electromagnetic signals λ_T and λ_R deflected the deflector 62 carry communications transmitted λ_T by the device and communications received λ_R by the device).

10). With regard to claims 27, 55 and 83, Rockwell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 29 and 57 above. And Rockwell and Sakanaka and Riley et al further disclose wherein the aperture structure is a telescope (the telescope 64 in Figure 2 of Rockwell).

11). With regard to claims 65, 79, Rockwell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 57 and 60-62 above. And Rockwell and Sakanaka and Riley et al disclose a first stack of deflectors for deflecting respective electromagnetic signals (e.g., 62 in Figure 2 of Rockwell, and 24 in Figure 1 of Sakanaka) passing through the aperture structure at respective angles, individual means for deflecting in the first stack deflecting substantially all signals each within its respective non-overlapping wavelength band (Figure 29 of Riley et al, the deflectors 266, 268, 270 and 272 form a stack; and the deflector 272 deflect all signals within a wavelength band "BLUE") and passing signals deflected by other means for deflecting in the second stack. (Figure 29 of Riley et al, a deflector, e.g., 270, passes a signal, e.g. "BLUE" deflected by another deflector, e.g., deflector 272).

But, Rockwell and Sakanaka and Riley et al does not teach a second stack of means for deflecting respective electromagnetic signals passing through the aperture structure at respective angles, individual means for deflecting in the second stack

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deflecting substantially all signals each within its respective non-overlapping wavelength band and passing signals deflected by other means for deflecting in the second stack.

Since Rockewell and Sakanaka and Riley et al teach a stack of deflectors, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in system disclosed by Rockewell and Sakanaka and Riley et al a second stack of deflectors. The suggestion/motivation for doing so would have been to further increase the system capacity. Claim 65 is not patentable different from the Rockewell and Sakanaka and Riley et al, because it is "to duplicate a part for a multiple effect" (see *St. Regis Paper Company v. Bemis Company, Inc.*, 193 USPQ 8 (CA 7 1977) "It is difficult to conceive of a more obvious method of strengthening a certain type of bag than putting one bag inside of another.").

12). With regard to claim 80, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 57, 60 and 79 above. And Rockewell and Sakanaka and Riley et al further disclose wherein individual means for deflecting in a stack pass signals deflected by other means for deflecting in a stack (e.g., Figure 29 of Riley et al, the deflectors 266, 268, 270 and 272 form a stack; and a deflector, e.g., 270, passes a signal, e.g. "BLUE" deflected by another deflector, e.g., deflector 272).

13). With regard to claims 117 and 118, Rockewell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1 and 29 above. And Rockewell and Sakanaka and Riley et al further disclose wherein the device or method transmits and/or receives wavelength division multiplexing electromagnetic signals (Figure 2 of

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Rockwell, e.g., the λ_T is a wavelength division multiplexed optical signal comprising λ_1 and λ_2).

7. Claims 2, 30, 58 and 81 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rockwell (US 6,327,063) and Sakanaka (US 7,058,307) and Riley et al (US 6,763,149) as applied to claims 1, 29 and 57 above, and in further view of Rice (US 5,347,387).

1). With regard to claims 2, 30 and 58, Rockwell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 1, 29 and 57 above. And Rockwell further disclose an aperture linear/circular polarization device (the Polarization Changer 56 in Figure 2) after the deflector (mirror 62). But, the linear/circular polarization device in Rockwell's system is not between at least one of the deflectors and the aperture structure.

However, the polarization changer (56 in Figure 2) can be put between the mirror 62 and the telescope 54. Rice et al discloses such a polarization beam rotator (16 in Figure 1) that is between one of the deflectors (converging mirror) and the aperture structure (14 and 15 in Figure 1).

By putting the polarization beam rotator, the signals with different polarizations can be separated by the following polarization beam splitter. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the polarization rotator as taught by Rice to the system of Rockwell and Sakanaka and Riley et al so that the system can transmit and receive signal with different polarizations and the system capacity can be substantially increased.

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2). With regard to claim 81, Rockwell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 57, 60 and 79 above. And Rockwell discloses a polarization beam splitter (54 in Figure 2). But Rockwell and Sakanaka and Riley et al does not disclose the polarization beam splitter coupled to the first stack, second stack, and the aperture means.

However, Rice discloses a polarization beam splitter (17 in Figure 1) coupled to the reflector (Mirror 20 in Figure 1) and the aperture (14 and 15 in Figure 1). The combination of Rockwell and Sakanaka and Riley et al disclose an aperture and two stacks of deflectors, therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the polarization beam splitter as taught by Rice to the system of Rockwell and Sakanaka and Riley et al so that the beam splitter can couple the first stack, second stack, and the aperture, and then system can transmit and receive to and from multiple remote devices at a time and the system capacity can be substantially increased by using the polarization multiplexed signals.

8. Claim 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rockwell (US 6,327,063) and Sakanaka (US 7,058,307) and Riley et al (US 6,763,149) as applied to claims 57, 60-62 and 65 above, and in further view of Huang et al (US 6,643,064).

Rockwell and Sakanaka and Riley et al disclose all of the subject matter as applied to claims 57, 60-62 and 65 above. But Rockwell and Sakanaka and Riley et al do not disclose wherein at least one second stack deflectors' wavelength band is located between two first stack deflectors' wavelength bands and at least one first stack

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deflectors' wavelength band is located between two second stack deflectors' wavelength bands.

However, to interleave two set of signals is well known and a common practice in the art. Huang et al discloses a system and method (Figure 1) to separate two sets of signals with different polarizations (Figure 1, e.g., the signal 1, 3, 5 etc. have one polarization and signals 2,4 and 6 etc have another polarization), and the wavelength band of each signal in set 200 is between two wavelength bands of two signals in the second set of signal 300.

Huang et al discloses a system and method that can decrease the interval between adjacent channels and thus increase the total transmission capacity under the existing network structure using the optical signal interleaver comprised of a polarization beam splitter/combiner, a polarization rotator, a polarization beam displacer, and a beam angle deflector, the incident beam output from an optical fiber collimator (the light signal with all wavelengths) can be separated into an O-ray and an E-ray, which then enter two ports of a double optical fiber collimator; and then the interference between the adjacent channels is decreased; and thus, the system can increase the total transmission capacity under the current network structure.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the wavelength interleaving method as taught by Huang et al to the system of Rockwell and Sakanaka and Riley et al so that one second stack deflectors' wavelength band is located between two first stack deflectors' wavelength bands and one first stack deflectors' wavelength band is located between

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two second stack deflectors' wavelength bands and then the system can transmit and receive signal with different polarizations and the system capacity can be substantially increased.

Allowable Subject Matter

9. Claims 68-78 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. Claims 85-99 and 101-115 allowed.

11. The following is a statement of reasons for the indication of allowable subject matter: the present invention comprises a free space communication device for increasing traffic throughput and widening the utility of optical terminals. And the wavelength division and polarization division multiple access free space optical terminal is disclosed; using polarization beam splitter, polarization rotators and stacks of deflectors which are wavelength dependent and movable, the device can transmit and receive electromagnetic signals through a single aperture to and from multiple remote devices at the same time. The closest prior art Rockwell (US 6,327,063) and Sakanaka (US 7,058,307) shows a similar system and a single aperture. However, the prior art fails to disclose the stacks of movable deflectors that can deflect signals at nearly normal incidence, and the prior art also does not teach to communicate with multiple remote devices through a single aperture at the same time.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Orino et al (US 5,627,669) disclose optical transmitter-receiver and a wavelength selective filter is used.

Farr (US 6,940,593) discloses a stack of deflectors.

Bloom et al (US 5,710,652) discloses a laser communication transceiver and system.

Arnold et al (US 6,347,001) disclose a free-space laser communication system having six axes of movement.

Kato et al (US 6,618,177) discloses a light space-transmission device..

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Li Liu whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Li Liu
October 7, 2007



KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER